

**IT APPLICATIONS IN SUPPLY CHAIN ORGANIZATIONS:
A LINK BETWEEN COMPETITIVE PRIORITIES AND
ORGANIZATIONAL BENEFITS**

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The philosophy of supply chain management is founded on collaboration among supply chain partners.^{1,2} Central to collaboration is the exchange of large amounts of information along the supply chain, including planning and operational data, real time information, and communication. Information is seen as the “glue” that holds together the business structures that allow supply chains to be agile in responding to competitive challenges.^{3,4} The backbone of the supply chain business structure is information technology (IT), used to acquire, process, and transmit information among supply chain partners for more effective decision making. IT can be viewed as serving as an essential enabler of SCM activities.⁵

Exponential growth of technological capability has provided numerous choices in IT applications, geared toward improving functional integration, coordination, and decision making. Selecting appropriate IT applications is a daunting task for managers given the wide array of rapidly changing and costly technologies, with often only anecdotal evidence of achievable performance measures. However, decisions relative to adoption of specific IT applications need to consider alignment with the organization’s competitive priorities.^{6,7} Organizational competitive priorities should drive the types of IT applications used, with the anticipation that they will directly lead to measurable benefits. Selection of proper IT applications should stem from a clear understanding of the business model and desired benefits.⁸

Research to date has shown that IT has the overall potential of providing a significant competitive advantage to firms.^{9,10} We postulate that IT sophisticated companies focus on a specific set of competitive priorities, different from their less technologically sophisticated counterparts. Further, based on literature to date, we assume some degree of alignment between these priorities, the specific IT applications selected by these firms, and the measurable benefits achieved. Using this conceptual framework our study profiles organizational differences between firms based upon level of IT use, focusing on three key dimensions: 1) organizational

competitive priorities; 2) choice of specific IT applications; and 3) performance measures achieved.

BACKGROUND

Improvements in IT are significantly changing the role of logistics by breaking down organizational barriers and allowing information to flow freely between supply chain partners. As supply chain management and cycle time compression emerge as central strategies of logistics management¹¹, effective IT becomes necessary to support logistic processes.¹² IT has automated many routine logistics activities, enabling managers to focus on strategic issues and core competencies. Intermediate supply chain activities, such as distribution, are being reformulated to truly add value to the chain.¹³ These logistics activities, termed “supply chain” or “value chain”, are enabled and supported by the use of IT.¹⁴

A high level of IT capability has been shown to provide a clear competitive advantage and can be a differentiating factor in terms of company performance.^{15, 16} Bowersox and Daugherty identified information technology as one of the common factors associated with advanced logistics practices.¹⁷ Clinton and Closs used the Bowersox and Daugherty typology to relate firm practice to organizational strategy.¹⁸ The Clinton and Closs study confirms differences between strategies based on a number of factors, including information technology.

The extended enterprise model, developed by Bowersox and Daugherty¹⁹, Bowersox, Closs, and Stank²⁰, and modified by Edwards, Peters and Sharman²¹, identifies key attributes of firms moving toward world-class logistics. An integrated IT system is identified as a key component of this framework. The highest level firms within this framework operate seamlessly across boundaries due to IT capability that enables information to flow in real time.

Specifically, the type of IT used is a large factor in determining the nature and quality of interactions the company has with customers, suppliers, and trading partners. Some authors refer to IT as the company’s “digital nervous system.”²² However, while IT is a critical element of

SCM, IT is not a source of value by itself. Rather, it is the proper selection of IT that supports and enhances the functioning of value-added processes. The importance of aligning IT applications between characteristics of the application and the needs of the business has consistently been emphasized in the literature.^{23,24,25}

Managers are often faced with the challenge of selecting appropriate IT applications and setting realistic expectations of performance measures. Exacerbating the difficulty of this process are rapid changes in technology, proliferation of software intended to improve SC functioning, and a plethora of self proclaimed success stories.^{26,27,28} To remain competitive, companies are investing millions of dollars in technologies such as Enterprise Resource Planning (ERP) systems, network software, and e-business capabilities. Major advances in computer hardware, broadband technology, and software have made IT solutions possible, although expensive, for corporate-wide applications. Understanding profiles of companies aggressively using these technologies, how these companies compete, the applications they use, and benefits they have achieved, is of high importance.

CONCEPTUAL FRAMEWORK

Our study is based on the proposition that choice of competitive priorities is a factor in the firm's use of information technology, including overall IT sophistication, and the selection of IT applications intended to support the competitive strategy. Also, we assume that specific performance measures can be, at least in part, associated with the use of technology. These assumptions are supported by previous research.^{22, 23, 24} We present this research framework in Figure 1. Specific elements of this framework are discussed next.

(Figure 1 here)

Competitive Priorities

This framework differentiates five unique competitive priorities: *price*, *quality*, *customer service*, *time*, and *flexibility*. The last competitive priority, *flexibility*, can be further distilled into

four dimensions: *product flexibility*, *volume flexibility*, *launch flexibility*, and *access flexibility*.^{32,}

³³ These competitive priorities have been well established in the literature beginning with the work of Van Dierdonck and Miller³⁴ and Hayes and Wheelwright.^{35, 36} It should be noted that other priorities could be included, such as innovation.³⁷ However, in our study we have chosen to utilize the standard framework of competitive priorities.^{38, 35}

Price and *quality* are competitive priorities that focus organizational resources to compete on the basis of either low price or quality leadership. *Time* is a competitive priority that refers to a focus on faster production and delivery times, while *customer service* focuses on providing highly individualized services, such as high-performance design and customization.

The last competitive priority, *flexibility*, refers to a company's agility, and can take on a number of forms.⁴⁰ *Product flexibility* is the ability of a company to offer a large number of product features and options, and to rapidly add or delete these features based on market competition. *Volume flexibility* is the ability to speed-up production to meet peak demands or cut production in slack periods, a feature especially important in industries characterized by extreme demand fluctuations. *Launch flexibility* is the ability to reduce time from idea conceptualization to product design, production, and final delivery. This capability is important in industries characterized by rapid rates of technological change and in business segments where style changes are frequent. Finally, *access flexibility* refers to the ability of a firm's distribution system to deliver products to multiple market segments, which can change on quick notice. Being quicker than other firms at getting products to new market segments can be an important competency to allow the firm to stay ahead of competitors.

The literature has well established that to be successful an organization needs a clear understanding of its competitive priorities and that equal focus on all priorities is not possible.⁴¹ The problem is that each priority requires a unique type of organizational structure and infrastructure, and these may greatly differ based upon specific priorities chosen. One aspect of

the organizational infrastructure is the type of information technology selected. The chosen competitive priority should drive the level of a firm's technological sophistication through allocation of resources and setting of investment priorities. This, in turn, impacts the types of applications selected. In a properly functioning organizational system specific performance measures should be derived from investments in technologies and specific applications selected.

⁴² Ideally, these performance measures should be evaluated on a regular basis with respect to their support of chosen competitive priorities.

IT Applications

Information technology (IT) can be defined as technology used to acquire, process, and transmit information for more effective decision making.⁴³ A number of methods can be used to classify information technologies. One functional classification is provided by Barki, Rivard, and Talbot where IT is aggregated into six categories: transaction processing systems, decision support systems, interorganizational systems, communication systems, storage and retrieval systems, and collaborative work systems.⁴⁴ Kendall offers a simpler classification whereby IT is divided into production-oriented information technologies and coordination-oriented information technologies.⁴⁵

Similar to Kendall's classification, we classify information technologies in two broad categories: *operations-oriented information technologies* and *marketing-oriented information technologies*. Operations-oriented information technologies are those that aid decision making and enable tasks to be accomplished more efficiently, within and between organizations. Marketing-oriented information technologies are those that aid selling, advertising, promotion, and negotiation. Six operations-oriented and three marketing-oriented information technologies are evaluated as indicated in Figure 1.

Organizational Performance Measures

Numerous measures have been suggested in the literature for evaluating organizational and supply chain performance.⁴⁶ Our study uses a wide range of performance measures broadly classified into two categories: *operations performance measures* and *strategic performance measures*. The former specifically measure improvements in the operation of the system. These measures are easier to quantify and are more short term in nature. In contrast strategic performance measures are more difficult to quantify and take a longer duration to attain. Our study evaluates three operations and five strategic performance measures shown in Figure 1.

RESEARCH METHODOLOGY

Data Collection

This research uses a survey methodology for data collection. The type of data needed, ranging from chosen competitive priorities to performance measures achieved, is strategic in nature. Consequently, the instrument was sent to the President or CEO of primarily large manufacturing companies with annual sales in excess of \$4.5 billion. We focused on large firms typically seen as leaders in SCM. The instrument was initially field tested by members of the Council of Logistics Management (CLM) and the National Organization of Purchasing Management (NAPM). Following modification, the instrument was mailed to the heads of 2,000 U.S. industrial companies.

The majority of the companies responding to the survey were manufacturing firms (84.7 percent). The remaining firms were classified as department stores/mass retailers (4.5 percent), warehouse and distribution (7.2 percent), and transportation (3.6 percent). The first mailing occurred in November 1999 with a follow-up reminder faxed to all of non-respondents on January 15, 2000. The closing date for completing the questionnaire was February 15, 2000.

Of the responses received, about one third were returned because of a corporate policy prohibiting company participation in research studies of this nature or a change in address. From

the remaining 1,340 potential company participants, 116 useable questionnaires were returned. Although the response rate was only 8.7 percent, given the firm size criterion, the total response rate of 116 is quite large relative to most studies of this nature. The typical respondent to the survey held the title of President, CEO, Vice President, or Director of procurement and purchasing, as specifically indicated on the survey.

The Survey Instrument

The survey contained six categories of questions: general company information; the nature of the strategic planning process; focus on competitive priorities; the degree of IT usage; reliance on specific IT applications; and achievements on specific performance measures. All questions used a five-point Likert type scale. The survey data were compiled and analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows.

Testing for Non-Response Bias

To ensure adequacy of the response sample, an issue with any survey methodology, our study tested for non-response bias. Non-response bias was tested by progressively comparing the demographics of the first and second wave of respondents. The reasoning behind this practice is that the last wave of respondents should be most like that of non-respondents, compared to the first wave. Dimensions tested were average sales, market share growth, and industry mix. No significant differences were found between the two samples.

Level of IT Usage

To identify level of IT usage, survey respondents were asked to rate their respective companies in terms of the degree of IT usage relative to the norm for their industry. The question was based on a five-point Likert type scale with *one* indicating least usage, *three* average usage, and *five* highest usage. Respondents were instructed that companies with low or high ratings

would be considered below or above the prevailing level of IT usage in their respective industry. A medium rating would reflect the standard in the industry. The responses were then aggregated into three broad categories: *low*, *medium*, and *high*. Respondents that rated their companies either a *one* and *two* formed the low IT category. A rating of *three* (the median) formed the medium IT category, and ratings of *four* and *five* formed the high IT category.

Figure 2 shows the division of survey respondents based on level of IT usage. Survey respondents are roughly evenly divided based on IT level, with about twenty-six percent of the companies identified as having high IT usage, thirty-six percent as medium, and thirty-eight percent as low.

(Figure 2 here)

One issue of concern is the validity of the using a self-reported rather than an objective measure of IT sophistication. First, setting an arbitrary norm was not appropriate as standards of technology greatly vary between industry segments and would only confound errors. Second, a subjective or perceptual measure was considered important as studies have shown these perceptions to define corporate reality and influence decision making behavior.^{47, 48, 49} Finally, our study statistically shows consistency between self-reported and actual data based on the degree of usage of specific IT applications, providing validity to the self-reported measure used.

Research Hypotheses

Studies such as that of Bowersox and Daugherty⁵⁰ and Clinton and Closs⁵¹ provide evidence that strategic differences exist between firms with differing levels of IT use. This leads to our first hypothesis:

H1: Firms with a high level of IT use focus on a different set of competitive priorities than firms with low or medium IT use.

The literature points to the importance of aligning IT capabilities with the competitive priorities of the organization. Differences in strategic orientation of firms should lead to

differences in the emphasis on specific IT applications.^{52, 53} This forms the basis of our next hypothesis:

H2: High IT firms have significantly higher usage of specific information technologies compared to low or medium IT firms.

High IT usage is intended to enhance collaboration and information sharing, which is expected to lead to increased performance⁵⁴. This leads to our last hypothesis:

H3: Firms with high IT usage have significantly higher performance compared to firms with low or medium IT usage.

These three hypotheses address the three key dimensions of our conceptual framework: competitive priorities, IT applications used, and performance measure achievements. Specific findings are discussed next.

RESULTS

Competitive Priorities and IT Usage

Findings relative to the first hypothesis, **H1**, are shown in Table 1. The scale measuring the degree of importance shows only four dimensions, ranging from less important to extremely important. Our survey question was based on a five-point scale that included an option for *unimportant*. However, as this option did not have responses it was omitted due to space consideration. Significant differences at the 0.05 percent level are shown between both high and low IT firms, as well as high and medium IT firms.

Our findings reveal no significant differences based on IT usage relative to *price*, *customer service*, or *time*. Irrespective of IT level, most respondents find competition based on *price* less important, *customer service* extremely important, and *time based competition* of average importance. However, we find large differences relative to dimensions of *quality* and *flexibility*.

Differences based on quality are large, with sixty-seven percent of the high IT firms considering quality *extremely* important. By contrast, the number of low/medium IT firms that consider quality *extremely* important is well under fifty percent, twenty-nine and forty-one percent respectively. It appears that a high focus on quality drives a greater IT orientation. This is also supported by the finding that medium IT firms, though lagging their high IT counterparts, have a considerably higher quality orientation than firms identified as low IT.

(Table 1 here)

Flexibility also appears significantly more important for high IT firms, particularly product, launch, and access flexibility. Flexibility provides a company agility to rapidly respond to environmental uncertainty. It appears that firms choosing to compete on the basis of flexibility consider IT an important enabler of their activities.

These findings provide support for the first hypothesis, **H1**. In addition to the statistical results shown in Table 1, Pearson's correlation coefficients were computed for all pairings. Though not shown due to space consideration, the significance of the correlation coefficients confirms the initial statistical tests. Based on these findings we conclude that high IT firms indeed focus on a different set of competitive priorities, with significantly greater emphasis on quality and flexibility, compared to low and medium IT firms.

IT Applications and Level of IT Usage

Findings relative to our second hypothesis, **H2**, are shown in Tables 2 and 3. These are differentiated based on operations and marketing oriented applications, with significant differences at the 0.05 level highlighted.

Overall our findings reveal a lag in the adoption of many SCM information technologies, with most of the responses clustered in the center of the measurement scale. For example, there were no respondents that indicated complete usage of CPFR regardless of IT level. Still we note differences in the pattern of usage for high IT firms. High IT firms are found to have

significantly greater usage of operations-oriented technologies. However, no differences are found for marketing-oriented technologies. For example, technologies such as ERP, CPFR, real time access to POS (point-of-sale) data, all have significantly greater usage by these firms. By contrast, there are no significant differences in the usage of marketing-oriented technologies, such as web-based catalogues, web-based auctions, and web-based marketing.

These findings suggest that IT usage, currently at an early stage, is still focused on operational issues and has not advanced to issues beyond supply chain functionality. These findings provide only partial support for hypothesis, **H2**. We conclude that high IT firms have a significantly higher usage of operations-oriented information technologies compared to low and medium IT firms, but not of marketing oriented information technologies. Our findings are further supported through the use of Pearson's correlation coefficients for all pairings.

(Tables 2 and 3 here)

Performance Measure Achievements and Level of IT Usage

Tables 4 and 5 show findings relative to our third hypothesis, **H3**. Our results show that high IT firms excel in certain performance measures, most operational and some strategic.

(Tables 4 and 5 here)

High IT firms are found to have a disproportionate success rate in cost reduction, cycle time reduction, quality, and new product development. These performance measures are in line with the competitive priorities that are the focus of high IT firms, namely quality and flexibility. Interestingly, no special benefits were achieved in the areas of new innovations, access to product opportunities, and access to new technologies. While these latter benefits are theoretically possible through information technology use, technological capability and widespread use are still at an early stage.

Based on these findings we accept hypothesis **H3**, and conclude that high IT firms show higher achievement on a number of performance measures. We note that our study

does not show direct causation between high IT use and specific performance measures. However, these findings are still important in providing an overall profile of high IT firms.

DISCUSSION

The purpose of this research was to profile companies with a high degree of IT use, looking at a number of organizational factors in conjunction with IT level. In addition to the findings described thus far, additional findings help us develop a better profile of high technology firms. We correlated IT level with a number of additional organizational factors. While a number of these, such as type of environmental uncertainty, length of product life cycle, and nature of strategic planning process, did not reveal any significant differences, other findings were of interest.

We find degree of customization to be positively related to the level of technology use. Forty-six percent of high IT firms identified themselves as offering primarily customized products, compared with thirty and twenty-five percent of low and medium IT firms, respectively. This is in line with our finding that high IT firms compete on flexibility, a common competitive priority for firms in high customization environments.⁵⁵ We also find that high IT firms place greater emphasis on SCM. Twenty-seven percent of high IT firms indicated SCM to have a significant role in the strategic planning process, compared to only two and ten percent for low and medium IT firms, respectively. Finally, the level of IT usage appears related to aggregate company performance. Thirty-three percent of high IT firms reported a substantial growth in market share over the past five years, compared to seventeen and twenty-five percent for low and medium IT firms.

CONCLUSION

Our findings lead to a number of important managerial and research implications.

Managerial Implications

Use of IT is found to provide a significant competitive advantage for firms. However, our study shows that the use of IT needs to be linked with organizational competitive priorities. The advanced IT firms in our study focused primarily on quality and flexibility, competitive priorities in line with the customization orientation of these firms. These firms are also found to succeed on performance measures that are in line with these priorities, documenting the linkage between competitive priorities and organizational benefits. Our study does not show that these are the only successful competitive priorities in today's market. Companies that focus on a different set of priorities, or operate in mass production environments with standardized products, may not require the same types of information technologies. Some studies suggest that firms in this latter environment do not require as much flexibility from their IT systems but need greater efficiency in processing routine information.⁵⁶

Our study also shows that information technology is still in its infancy relative to usage. Even the companies with high IT capability were found to primarily use operations-oriented information technologies. Despite all the discussion in the popular press about current IT capability, our findings show that few firms have embarked on using these technologies to their full potential. The frequent image that these technologies are being used en masse has not been documented here. Managers should clearly understand their company's competitive priorities and evaluate information technology adoptions for their ability to support these priorities, rather than follow current competitors.

Although IT usage is found to be positively linked with a number of performance measures managers need to be realistic in their expectations of the achievements IT usage can bring. The primary benefits were associated with operations performance measures such as cost, time, quality, and product development. Though there has been much theoretical discussion about the potential benefits of IT usage our study does not document benefits at the strategic

level, such as in the areas of innovation, competitive intelligence, and access to new product opportunities. IT usage can clearly contribute to improved organizational performance by serving as a tool to enhance business functioning. But, it is not a panacea for all the organizations competitive problems.

Future Research

This research raises the question as to whether the same types of information technologies are equally appropriate in environments that require customization and flexibility versus mass production of standardized products. Customization environments are generally characterized by dynamic product and process requirements. Decision making is often decentralized and there is greater worker autonomy. Information technology needed in this environment needs to support the creative process and should be flexible. The opposite is true in mass production environments characterized by greater stability in both product and process.⁵⁷ These latter environments may need to focus on information technology that promotes efficient standardization of work processes. Future research should explore the specific information technologies that are best suited for each type of environment, considering not only the benefits but the costs of implementation.

Although our evidence shows that IT sophisticated firms have achieved performance measures disproportionately higher than firms with lower levels of IT, our study does not prove that high IT use leads to improvements in performance measures. Future research should evaluate the linkages between these variables more directly. As technological capability and usage rapidly change, more ongoing research is needed to help academics and practitioners keep abreast of changes, capabilities and key drivers of technological usage.

NOTES

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FIGURE 1: CONCEPTUAL FRAMEWORK

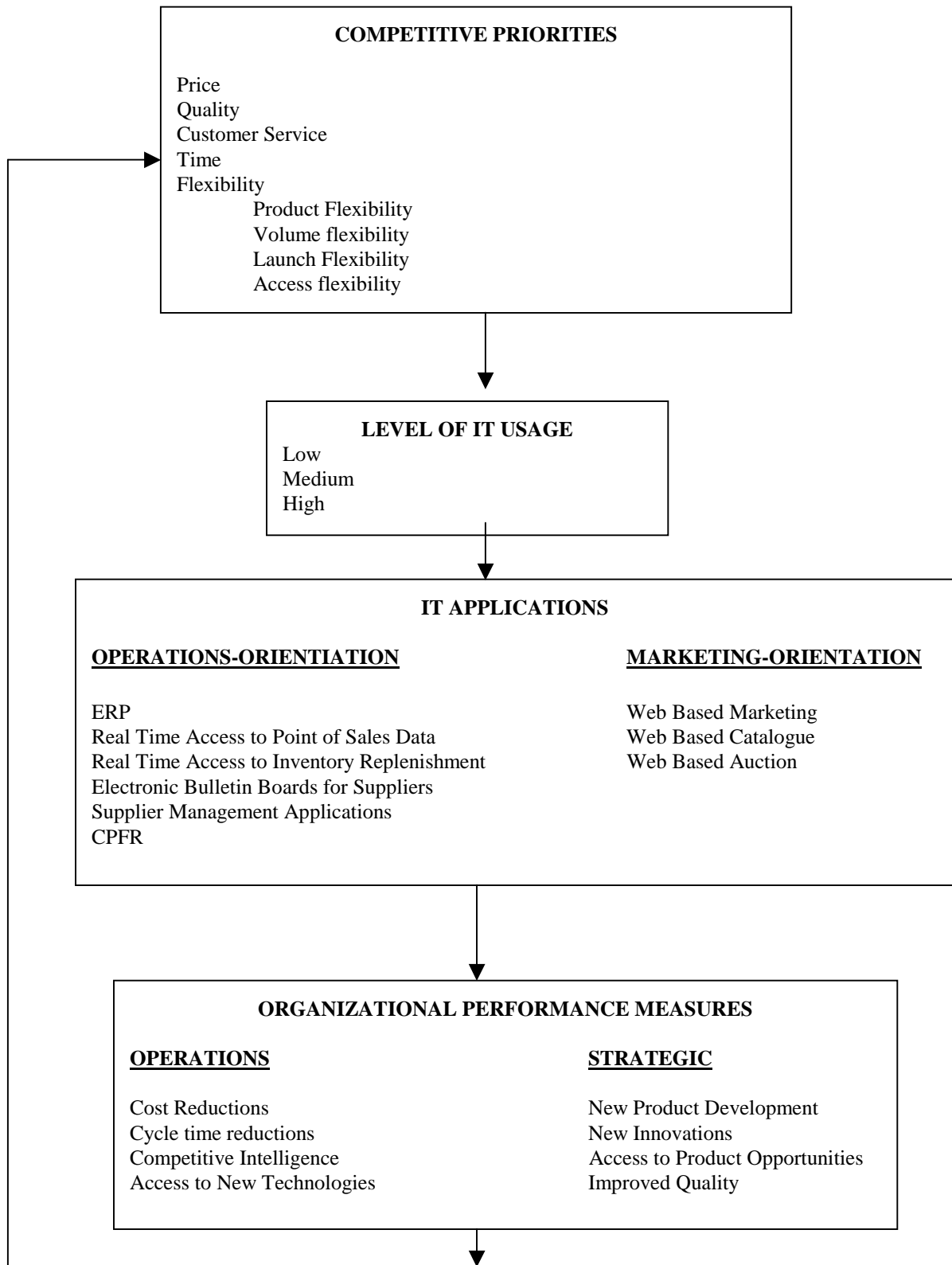


FIGURE 2
IT USAGE LEVEL OF SURVEY RESPONDENTS

Levels of Technology	Response (%)
Low Level	37.8
Medium Level	36.0
High Level	26.1

TABLE 1

COMPETITIVE PRIORITIES VERSUS IT USAGE

Competitive Priorities	DEGREE OF IMPORTANCE (given are percentage of respondents)			
	<i>Less Important</i>	<i>Quite Important</i>	<i>Very Important</i>	<i>Extremely Important</i>
1. Price				
Low IT	39	29	22	10
Medium IT	38	18	31	13
High IT	33	19	33	15
2. Quality				
Low IT	7	20	44	29
Medium IT	3	5	51	41
High IT	0 *	11	22	67 * *
3. Customer Service				
Low IT	0	15	34	51
Medium IT	2	8	31	59
High IT	0	3 *	41	56
4. Time				
Low IT	26	33	26	15
Medium IT	16	41	32	11
High IT	19	37	25	19
5. Product Flexibility				
Low IT	32	22	32	14
Medium IT	32	21	42	5
High IT	15 * *	15	37	33 * *
6. Volume Flexibility				
Low IT	32	27	39	2
Medium IT	21	36	33	10
High IT	26	37	22	15 *
7. Launch Flexibility				
Low IT	44	37	19	0
Medium IT	36	15	44	5
High IT	22 * *	15	44	19 * *
8. Access Flexibility				
Low IT	33	24	34	9
Medium IT	15	21	41	23
High IT	22	7 **	37	34* *

* Significant differences between high and low IT firms at 0.05 level.

** Significant differences between both high and medium, and high and low IT firms at 0.05 level.

TABLE 2
USE OF OPERATIONS-ORIENTED IT APPLICATIONS

OPERATIONS APPLICATIONS	DEGREE OF USE (numbers given are percentage of respondents)				
	No Usage	Little Usage	Some Usage	Significant Usage	Complete Usage
1. ERP					
Low IT	20	12	34	25	9
Medium IT	11	28	28	25	8
High IT	14	15	31	23	16 **
2. Real Time Access to POS Data					
Low IT	32	22	29	15	3
Medium IT	31	28	11	19	11
High IT	19 **	19	22	26	14
3. Real Time Access to Inventory Data					
Low IT	25	24	27	15	9
Medium IT	11	26	24	29	10
High IT	7 *	33	22	19	19 *
4. Electronic Bulletin Boards for Suppliers					
Low IT	53	30	13	5	0
Medium IT	49	21	23	7	0
High IT	32 *	33	19	8	8 *
5. Supplier Management IT					
Low IT	17	41	20	15	7
Medium IT	5	36	44	10	5
High IT	7	22	26	37 **	8
6. CPFR					
Low IT	30	37	22	11	0
Medium IT	16	37	42	5	0
High IT	11 *	33	26	30 **	0

* Significant differences between high and low IT firms at 0.05 level.

** Significant differences between both high and medium, and high and low IT firms at 0.05 level.

TABLE 3
USE OF MARKETING-ORIENTED IT APPLICATIONS

MARKETING APPLICATIONS	DEGREE OF USE				
	(numbers given are percentage of respondents)*				
	No Usage	Little Usage	Some Usage	Significant Usage	Complete Usage
1. Web Based Marketing					
Low IT	22	32	19	22	5
Medium IT	15	21	33	26	5
High IT	15	19	55	7	4
2. Web Based Catalogs					
Low IT	15	39	29	12	5
Medium IT	23	33	28	13	3
High IT	22	22	41	11	4
3. Web Based Auctions					
Low IT	73	12	10	0	5
Medium IT	72	15	8	5	0
High IT	92	0	4	0	4

* Significant differences were tested; none were found.

TABLE 4**OPERATIONS PERFORMANCE MEASURES VERSUS IT USAGE**

OPERATIONS PERFORMANCE MEASURE	DEGREE OF BENEFIT ATTAINED (numbers indicate percentage of respondents)				
	No Benefit	Minor Benefit	Some Benefit	Significant Benefit	Major Benefit
1. Cost Reduction					
Low IT	0	28	33	30	10
Medium IT	3	13	36	39	9
High IT	0	5 *	31	42	22 **
2. Cycle Time Reduction					
Low IT	15	23	35	27	0
Medium IT	8	21	36	31	5
High IT	0 *	15	35	38	12 *
3. Improved Quality					
Low IT	5	30	32	25	8
Medium IT	3	14	31	45	8
High IT	0	13	23	54 *	10

* Significant differences between high and low IT firms at 0.05 level.

** Significant differences between both high and medium, and high and low IT firms at 0.05 level.

TABLE 5**STRATEGIC PERFORMANCE MEASURES VERSUS IT USAGE**

STRATEGIC PERFORMANCE MEASURES	DEGREE OF BENEFIT ATTAINED (numbers indicate percentage of respondents)				
	No Benefit	Minor Benefit	Some Benefit	Significant Benefit	Major Benefit
1. Product Development					
Low IT	29	31	26	15	0
Medium IT	10	33	38	15	3
High IT	11	19	35	23	12 **
2. Innovation					
Low IT	20	45	18	18	0
Medium IT	8	38	31	21	2
High IT	12	19	42	23	4
3. Competitive Intelligence					
Low IT	10	38	25	20	8
Medium IT	10	31	38	21	0
High IT	4	38	50	8	0
4. Access to New Product Opportunities					
Low IT	13	38	33	15	2
Medium IT	13	31	33	23	0
High IT	4	11	50	35	0
5. Access to New Technologies					
Low IT	5	47	23	23	2
Medium IT	8	21	28	39	4
High IT	8	8	49	31	4

* Significant differences between high and low IT firms at 0.05 level.

** Significant differences between both high and medium, and high and low IT firms at 0.05 level.